

APPENDIX A (1)

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ProcInsFile { type "Dataset Transforms" ver "4.1.03" date
gitransform { name "!Unit3_down!" expr "Sif(!AL3IG03A! < 75, 1.0, 0.0) ; if the unit is down then application goes
away." }
gitransform { name "!mw_o2_limit!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_o2_limit", !AL3IG03A!), 1,
SFILTER_FREEZE) ; read in tuneable parameters" }
gitransform { name "!mw_exit_gas_max!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_exit_gas_max", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_sh_mill_min_limit!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_sh_mill_min_limit", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_rh_mill_min_limit!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_rh_mill_min_limit", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_sh_mill_out_desired!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_sh_mill_out_desired", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_rh_mill_out_desired!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_rh_mill_out_desired", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_wb_fur_max!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_wb_fur_max", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_sh_ccofa_min!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_sh_ccofa_min", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_rh_ccofa_min!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_rh_ccofa_min", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_sh_stm_limit!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_sh_stm_limit", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_GAM_check_generation_limit!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_GAM_check_generation_limit", !AL3IG0
3A!), 1, SFILTER_FREEZE) }
gitransform { name "!mw_sh_stm_time_filter!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_sh_stm_time_filter", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_fuz_diff!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_fuz_diff", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!mw_nox_time_filter!" expr
"SEXP Ave(Sreadparam("c:\duke\mw_max\max_mw_tune.params", "mw_nox_time_filter", !AL3IG03A!), 1,
SFILTER_FREEZE) }
gitransform { name "!3sa_up!" expr "Sif(!FT3FH00! >= 2.8, 1.0, 0.0) ; scan to see which feeders are up" }
gitransform { name "!3sb_up!" expr "Sif(!FT3FH06! >= 2.8, 1.0, 0.0) " }
gitransform { name "!3sc_up!" expr "Sif(!FT3FH12! >= 2.8, 1.0, 0.0) " }
gitransform { name "!3sd_up!" expr "Sif(!FT3FH18! >= 2.8, 1.0, 0.0) " }
gitransform { name "!3ra_up!" expr "Sif(!FT3FH03! >= 2.8, 1.0, 0.0) " }
gitransform { name "!3rb_up!" expr "Sif(!FT3FH09! >= 2.8, 1.0, 0.0) " }
gitransform { name "!3rc_up!" expr "Sif(!FT3FH15! >= 2.8, 1.0, 0.0) " }
gitransform { name "!3rd_up!" expr "Sif(!FT3FH21! >= 2.8, 1.0, 0.0) " }
gitransform { name "!s_fdsr_up!" expr "!3sa_up! + !3sb_up! + !3sc_up! + !3sd_up! ; perform a few calculations needed
by the logic" }
gitransform { name "!r_fdsr_up!" expr "!3ra_up! + !3rb_up! + !3rc_up! + !3rd_up!" }
gitransform { name "!Exit_gas_temp!" expr "(!AM3FH91E! + !AM3FH86E! + !AM3FH81E!) / 3 ; below we begin the
logic scans to surface and remove bottlenecks to MW production" }
gitransform { name "!Max_O2_limit_high_condition!" expr "Sif(!O031X095! > !mw_o2_limit!, Sif(!DC3A104C! >
0.5, 1.0, 0.0) , 0.0) ; If true, the O2 setpoint is higher than necessary for max mw. recommend lower O2 sp." }
gitransform { name "!High_exit_gas_temp_condition!" expr "Sif(!Exit_gas_temp! > !mw_exit_gas_max!, 1.0, 0.0) ; If
true then the exit gas temp is getting high, recommend 1K Blowers and Preheat Sootblower use" }

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APPENDIX A (2)

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gtransform { name "!Positive_SA_mill_press_condition!" expr " Sif(!PT3FH14B! >= 0.0, Sif(!3sa_up! > 0.5,
Sif(!TE3FH4S! > !mw_sh_mill_min_limit!, 1.0, 0.0) , 0.0), 0.0) ; if true SA mill is going positive, recomend lowering
mill temp set point" }
gtransform { name "!Positive_SB_mill_press_condition!" expr " Sif(!PT3FH30B! >= 0.0, Sif(!3sb_up! > 0.5,
Sif(!TE3FH54! > !mw_sh_mill_min_limit!, 1.0, 0.0) , 0.0), 0.0) ; if true SB mill is going positive, recomend lowering
mill temp set point" }
gtransform { name "!Positive_SC_mill_press_condition!" expr " Sif(!PT3FH36B! >= 0.0, Sif(!3sc_up! > 0.5,
Sif(!TE3FH60! > !mw_sh_mill_min_limit!, 1.0, 0.0) , 0.0), 0.0) ; if true SC mill is going positive, recomend lowering
mill temp set point" }
gtransform { name "!Positive_SD_mill_press_condition!" expr " Sif(!PT3FH42B! >= 0.0, Sif(!3sd_up! > 0.5,
Sif(!TE3FH66! > !mw_sh_mill_min_limit!, 1.0, 0.0) , 0.0), 0.0) ; if true SD mill is going positive, recomend lowering
mill temp set point" }
gtransform { name "!Positive_RA_mill_press_condition!" expr " Sif(!PT3FH27B! >= 0.0, Sif(!3ra_up! > 0.5,
Sif(!TE3FH51! > !mw_sh_mill_min_limit!, 1.0, 0.0) , 0.0), 0.0) ; if true RA mill is going positive, recomend lowering
mill temp set point" }
gtransform { name "!Positive_RB_mill_press_condition!" expr " Sif(!PT3FH33B! >= 0.0, Sif(!3rb_up! > 0.5,
Sif(!TE3FH57! > !mw_sh_mill_min_limit!, 1.0, 0.0) , 0.0), 0.0) ; if true RB mill is going positive, recomend lowering
mill temp set point" }
gtransform { name "!Positive_RC_mill_press_condition!" expr " Sif(!PT3FH39B! >= 0.0, Sif(!3rc_up! > 0.5,
Sif(!TE3FH63! > !mw_sh_mill_min_limit!, 1.0, 0.0) , 0.0), 0.0) ; if true RC mill is going positive, recomend lowering
mill temp set point" }
gtransform { name "!Positive_RD_mill_press_condition!" expr " Sif(!PT3FH45B! >= 0.0, Sif(!3rd_up! > 0.5,
Sif(!TE3FH69! > !mw_sh_mill_min_limit!, 1.0, 0.0) , 0.0), 0.0) ; if true RD mill is going positive, recomend lowering
mill temp set point" }
gtransform { name "!4Mill_SH_temp_low_condition!" expr " Sif(!s_fds_up! > 3.0, Sif(!TE3FH48! <
!mw_sh_mill_out_desired!) Sor (!TE3FH54! < !mw_sh_mill_out_desired!) Sor (!TE3FH60! <
!mw_sh_mill_out_desired!) Sor (!TE3FH66! < !mw_sh_mill_out_desired!) , 1.0, 0.0) , 0.0) ; If true then one or more
SH mill temp is too low for 4 mill operaiton, recommend increase to desired" }
gtransform { name "!4Mill_RH_temp_low_condition!" expr " Sif(!r_fds_up! > 3.0, Sif(!TE3FH51! <
!mw_sh_mill_out_desired!) Sor (!TE3FH57! < !mw_sh_mill_out_desired!) Sor (!TE3FH63! <
!mw_sh_mill_out_desired!) Sor (!TE3FH69! < !mw_sh_mill_out_desired!) , 1.0, 0.0) , 0.0) ; If true then one or more
RH mill temp is too low for 4 mill operaiton, recommend increase to desired" }
gtransform { name "!Wind_box_restriction_condition!" expr " Sif(!O038X854! > !mw_wb_fur_max!) Sand
(!DC3A104A! < 0.5) Sand (!DC3A104C! > 0.5) , 1.0, 0.0) ; if true then wind box restrictions exist, and recommend
reduce fur/wb max by 0.2" }
gtransform { name "!SA_CCOFA_restriction_condition!" expr " Sif(!PZ3FH10! < !mw_sh_ccofa_min!) Sor
(!PZ3FH11! < !mw_sh_ccofa_min!) , 1.0, 0.0) ; if true then CCOFA restrictions exist, and recommend reduce NOX set
point" }
gtransform { name "!RA_CCOFA_restriction_condition!" expr " Sif(!PZ3FH12! < !mw_rh_ccofa_min!) Sor
(!PZ3FH13! < !mw_rh_ccofa_min!) , 1.0, 0.0) ; if true then CCOFA restrictions exist, and recommend reduce NOX set
point" }
gtransform { name "!CCOFA_restriction_condition!" expr " Sif(!SA_CCOFA_restriction_condition! > 0.5 Sor
!RA_CCOFA_restriction_condition! > 0.5, 1.0, 0.0) ; accumulated CCOFA restricion scan" }
gtransform { name "!add_load_condition!" expr " Sif(!Max_O2_limit_high_condition! +
!High_exit_gas_temp_condition! + !Positive_SA_mill_press_condition! + !Positive_SB_mill_press_condition! +
!Positive_SC_mill_press_condition! + !Positive_SD_mill_press_condition! + !Positive_RA_mill_press_condition! +
!Positive_RB_mill_press_condition! + !Positive_RC_mill_press_condition! + !Positive_RD_mill_press_condition! +
!4Mill_SH_temp_low_condition! + !4Mill_RH_temp_low_condition! + !Wind_box_restriction_condition! +
!SA_CCOFA_restriction_condition! + !RA_CCOFA_restriction_condition! + !CCOFA_restriction_condition!) < 0.5
Sand !DC3A104C! < 0.5, 1.0, 0.0) ; If no alrams exist, and not O2 blocking incease, then add load" }
gtransform { name "!GP3A101A!" expr " 0.0 + ( Sif(Svalid(!Max_O2_limit_high_condition!) ,
Sif(!Max_O2_limit_high_condition! > 0.5, 1.0, 0.0) , 0.0) ) + ( Sif(Svalid(!High_exit_gas_temp_condition!) ,
Sif(!High_exit_gas_temp_condition! > 0.5, 2.0, 0.0) , 0.0) ) + ( Sif(Svalid(!Positive_SA_mill_press_condition!) ,
Sif(!Positive_SA_mill_press_condition! > 0.5, 4.0, 0.0) , 0.0) ) + ( Sif(Svalid(!Positive_SB_mill_press_condition!) ,
Sif(!Positive_SB_mill_press_condition! > 0.5, 8.0, 0.0) , 0.0) ) " }
gtransform { name "!GP3A101A!" expr " !GP3A101A! + ( Sif(Svalid(!Positive_SC_mill_press_condition!) ,
Sif(!Positive_SC_mill_press_condition! > 0.5, 16.0, 0.0) , 0.0) ) + ( Sif(Svalid(!Positive_SD_mill_press_condition!) ,
Sif(!Positive_SD_mill_press_condition! > 0.5, 32.0, 0.0) , 0.0) ) " }
gtransform { name "!GP3A101A!" expr " !GP3A101A! + ( Sif(Svalid(!Positive_RA_mill_press_condition!) ,
Sif(!Positive_RA_mill_press_condition! > 0.5, 64.0, 0.0) , 0.0) ) + ( Sif(Svalid(!Positive_RB_mill_press_condition!) ,
Sif(!Positive_RB_mill_press_condition! > 0.5, 128.0, 0.0) , 0.0) ) " }

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APPENDIX A (3)

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gtransform { name "!GP3AI01A!" expr "!GP3AI01A! + ( Sif(Svalid(!Positive_RC_mill_press_condition!) ,
Sif(!Positive_RC_mill_press_condition! > 0.5, 256.0, 0.0) , 0.0) ) + (Sif(Svalid(!Positive_RD_mill_press_condition!) ,
Sif(!Positive_RD_mill_press_condition! > 0.5, 512.0, 0.0) , 0.0) ) " }
gtransform { name "!GP3AI01A!" expr "!GP3AI01A! + ( Sif(Svalid(!4Mill_SH_temp_low_condition!) ,
Sif(!4Mill_SH_temp_low_condition! > 0.5, 1024.0, 0.0) , 0.0) ) + (Sif(Svalid(!4Mill_RH_temp_low_condition!) ,
Sif(!4Mill_RH_temp_low_condition! > 0.5, 2048.0, 0.0) , 0.0) ) " }
gtransform { name "!GP3AI01A!" expr "!GP3AI01A! + ( Sif(Svalid(!Wind_box_restriction_condition!) ,
Sif(!Wind_box_restriction_condition! > 0.5, 4096.0, 0.0) , 0.0) ) + (Sif(Svalid(!CCOFA_restriction_condition!) ,
Sif(!CCOFA_restriction_condition! > 0.5, 8192.0, 0.0) , 0.0) ) ; here we are building the word to pass back to the
operator display" }
gtransform { name "!GP3AI01A!" expr "!GP3AI01A! + ( Sif(Svalid(!add_load_condition!) , Sif(!add_load_condition!
> 0.5, 16384.0, 0.0) , 0.0) ) " }
gtransform { name "!avg_sh_fdr_spd!" expr "(!FT3FH00! + !FT3FH06! + !FT3FH12! + !FT3FH18!) / !s_fdrs_up! }
gtransform { name "!avg_rh_fdr_spd!" expr "(!FT3FH03! + !FT3FH09! + !FT3FH15! + !FT3FH21!) / !r_fdrs_up! " }
gtransform { name "!Avg_sh_stm_temp!" expr "SEXP_Ave(((AL3BC56A! + !AL3BC56B!) / 2) ,
!mw_sh_stm_time_filter!, SFILTER_FREEZE) " }
gtransform { name "!Steam_temp_too_low_condition!" expr " Sif(((AL3IG03A! >=
!mw_GAM_check_generation_limit!) Sand (!DC3AI03D! > 0.5) Sand (!Avg_sh_stm_temp! < !mw_sh_stm_limit!) ,
1.0, 0.0) ; If the unit is at highrates, and is ready for optimization, and the sh steam temp is low, then recommend GAM
addition" }

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APPENDIX B

| MAXIMIZE MW'S | | | |
|--|-----|--|--|
| Point ID | DIT | Constants | Logic |
| GP3A101A | 0 | mw_o2_limit = 2.5 | O2 > mw_o2_limit and ID Fan Dlocking Increase |
| | 1 | mw_exit_gns_max = 290 | Exit_Gas_Temp < mw_exit_gas_max Exit_Gas_Temp = (AM3FH01E + AM3FH00E + AM3FH01E) / 3 |
| | 2 | mw_sh_mill_min_limit = 100 | SA Mill Press > 0.0 & > mw_sh_mill_min_limit |
| | 3 | | SB Mill Press > 0.0 & > mw_sh_mill_min_limit |
| | 4 | | SC Mill Press > 0.0 & > mw_sh_mill_min_limit |
| | 5 | | SD Mill Press > 0.0 & > mw_sh_mill_min_limit |
| | 6 | mw_rh_mill_min_limit = 100 | RA Mill Press > 0.0 & > mw_rh_mill_min_limit |
| | 7 | | RD Mill Press > 0.0 & > mw_rh_mill_min_limit |
| | 8 | | RC Mill Press > 0.0 & > mw_rh_mill_min_limit |
| | 9 | | RD Mill Press > 0.0 & > mw_rh_mill_min_limit |
| | 10 | mw_sh_mill_out_desired = 180 | SH Mill_Out_Temp < mw_sh_mill_out_desired AND 4 SH Mill operation |
| | 11 | mw_rh_mill_out_desired = 180 | Mill_Out_Temp < Mill_Out and 4 RH Mill operation |
| | 12 | mw_wb_fur_max = 2.5 | WDIFur > mw_wb_fur_max and wb_min block not on & ID Fan Dlocking Increase |
| | 13 | mw_sh_ccola_min = 70 mw_rh_ccola_min = 70 | SH or RH CCOFAs < mw_ccola_min & ID Fan Dlocking Increase |
| | 14 | | bits 0-13 are clear & ID fans not blocking Increase |
| Model Optimizer | | | |
| GP3A101B | 0 | | avg SH_fdr_speed > max fdr speed avg RH_fdr_speed > max fdr speed |
| | 1 | mw_sh_stm_limit = 1050 mw_GAM_check_generation_limit = 200 mw_st_stm_time_filter = 0.00033 [1] | Once the Unit Is Ready for Optimization, and While MW > mw_GAM_check_generation_limit IF time_filtered avg SH_Temp < mw_sh_stm_limit |
| | 2 | | O2 Min > O2 Max |
| | 3 | | FDR spd MIN > FDR spd MAX |
| | 4 | | WD/Furn Min > WD/Furn Max |
| Condition | | | |
| O2 Is Higher than necessary for Maximizing Load | | | |
| Exit Gas Temperature to High | | | |
| SA Mill going positive SB Mill going positive SC Mill going positive SD Mill going positive RA Mill going positive RD Mill going positive RC Mill going positive RD Mill going positive | | | |
| 4 SH Mill Temperature to low | | | |
| 4 RH Mill Temperature to low | | | |
| wind box restrictions exist | | | |
| COOFAs restricting flow | | | |
| Load can be added | | | |
| Feeder bias detected | | | |
| Steam Temps too low | | | |
| Infeasible O2 Constraints | | | |
| Infeasible FDR constraints | | | |
| Infeasible WD/Furn Constraints | | | |
| Advice | | | |
| reduce Max O2 limit by 0.1 | | | |
| Dlow the IK Flowlers and the Preheater Sootblowers | | | |
| Reduce SA Mill Temp Target 2 deg F Reduce SB Mill Temp Target 2 deg F Reduce SC Mill Temp Target 2 deg F Reduce SD Mill Temp Target 2 deg F Reduce RA Mill Temp Target 2 deg F Reduce RD Mill Temp Target 2 deg F Reduce RC Mill Temp Target 2 deg F Reduce RD Mill Temp Target 2 deg F | | | |
| Raise temperature setpoint to 180 | | | |
| Raise temperature setpoint to 180 for all RH Mills | | | |
| reduce fur/wb max by 0.2 | | | |
| Lower NOx Target by 0.02 | | | |
| Add Load | | | |
| Increase Max Fdr Speed Above the avg_sh_fdr_spd and avg_rh_fdr_spd | | | |
| Consider GAM usage | | | |
| Increase O2 Max = O2 Min | | | |
| Increase FDR spd Max or decrease FDR spd Min | | | |
| Increase WD/Furn Max = WD/Furn Min | | | |